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May 24, 1995
SP307:052495.03

Mr. Andy Ledford
EG&G Rocky Flats, Inc.
Rocky Flats Environmental Technology Site
P.O. Box 464, Building 080
Golden, Colorado 80402-0464

Subject: MTS 343756 GG
OU4 Solar Ponds IM/IRA
Proposed Plan for Seismic Evaluation at OU4

Dear Mr. Ledford:

A recent EG&G seismic analysis resulted in an "inferred fault" being located within OU4. The proposed IM/IRA-EA Decision Document discusses this "inferred fault" and commits the DOE to a field investigation program to determine if the fault actually exists. In the event that the fault is verified, then the DOE is committed to determine if the fault is capable of future activity. Attachment 1 provides a proposed strategy for verifying whether the fault exists, and determining whether it is capable. Attachment 2 provides an estimated duration for the project. It should be noted that Attachment 2 is not a schedule because a start date has not been assigned. However, Parsons ES estimates that this program should be completed within a 15 to 17 week duration. Parsons ES has also provided an order of magnitude cost for EG&G planning purposes. The Parsons ES subcontractor cost to drill boreholes and a trench should not exceed $38,350 (dependent upon the number of boreholes required). The Parsons ES preliminary estimate to conduct the field program and prepare a report is on the order of magnitude of $90,000 (approximately 1,440 labor hours). Therefore, the total cost of the project is approximately $128,350.

Parsons ES recommends that the scope of the project be agreed upon before a final estimate and schedule are developed. Parsons ES looks forward to discussing this plan with your staff to finalize a program to resolve this important issue.

Please call me at 764-8811 or pager 687-2551 if you have any questions.

Sincerely,

Philip A. Nixon
Project Manager: Solar Pond IM/IRA

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ADMIN RECORD

PARSONS

A-0104-001567

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Attachment 1

TECHNICAL SUMMARY, PRELIMINARY WORK PLAN,
SCHEDULE AND BUDGET FOR DRILLING AND SAMPLING
SEISMIC EVALUATION BOREHOLES AT OU4

I. Preface

The Rocky Flats Environmental Technology Site Seismic Hazard Study (EG&G, 1994) evaluated the seismogenic (capable of generating $M > 5$ earthquakes in the future) probability of known faults within 25 km of RFETS. The Walnut Creek Fault, Rock Creek Fault, Valmont Fault, Golden-Boulder Front Range Fault System, Rocky Mountain Arsenal (Derby) Source Zone, and five regional sources were all evaluated in terms of recurrence probability and probable maximum magnitudes. All of these faults have some potential to rupture and release energy in excess of a magnitude 5 earthquake. It was concluded that the Derby source dominated the seismic hazard to RFETS. Ground motions for annual probabilities between 2×10^{-5} and 10^{-3} and greater are estimated to have maximum magnitudes of between 5.75 and 7.

This study also concluded that the potential for soil liquefaction at RFETS is negligible, that soils at RFETS will amplify ground motions at predominantly lower frequencies (below $\sim$5Hz), and that soil slopes may undergo some permanent displacement (up to 30 cm) during earthquake motions. Estimated permanent displacements are strongly affected by the depth of the water table below the crest of a hill slope.

The Geologic Characterization Report for the Rocky Flats Environmental Technology Site (EG&G, 1995) identified seven inferred faults within 4 km of the Protected Area. The faults are identified through estimated offset along a unique claystone marker bed. The claystone marker bed is identified through lithologic identification and unique down-hole geophysical signatures. One of these faults is inferred to pass through OU4 near SEPs 207-B in a north-northeasterly direction. This fault is labeled as Fault Number 3 on the attached structure contour map of the claystone marker bed. The inferred OU4 fault is identified by offset of the claystone marker bed observed in drill core from 3987, 0693, 1193, and 42892. The OU4 fault is presumed to be a high-angle reverse fault that dips to the east.

II. Work Plan for Verification of the OU4 Fault

Within OU4, the claystone marker bed has been identified in well 3987, which is located northeast of the northeast corner of SEP 207-B North. Well 3987 is presumed to be located on the western edge of the eastern up-thrown fault block, as shown on the attached structure contour map. The most proximal control on the claystone marker bed in the western down-thrown block

is found in drill-core from boreholes 1193 to the south, and 0693 to the west of Well 3987. Geometrically, if these identifications are correct, the inferred fault plane must pass to the west of well 3987 and east of the approximate center of SEP 207-C. Therefore the objective of this preliminary work plan is to install boreholes between these two points in order to identify the exact location of the fault plane. The location of the fault plane is critical to geotechnical and hydrogeologic design planning for the OU4 final engineered cover.

The claystone marker bed is located at a depth of approximately 92 feet (elevation 5,855) in Well 3987, where it is approximately 15 feet thick in the up-thrown fault block. The claystone marker bed has also been identified in the western down-thrown fault block at a depth of approximately 105 feet (elevation ~5830) in drill core from Borehole 0693, just northwest of OU4 in the north Walnut Creek drainage.

II.1 Borehole Installations

The first borehole will be installed north of the northwest corner of SEP 207-B North as shown on the attached structure contour map, to a depth of approximately 140 feet or until the claystone marker bed is penetrated. If the marker bed is located at an elevation that would suggest it is in the up-thrown fault block, the next borehole will be offset to the west in order to identify the boundary between the up-thrown and down-thrown fault blocks. If the marker bed is located at an elevation that would suggest it is in the down-thrown fault block, the next borehole will be offset or "stepped-out" to the east in order to identify the boundary between the up-thrown and down-thrown blocks. The "step out" distance will be determined in the field based on the results of the first hole and the understanding of the site geology. The investigation will continue in this manner until the orientation and location of the fault plane and associated fracture zone is delineated. It is estimated that this may be accomplished with a minimum of two boreholes. However, the potential for additional boreholes exists and is dependant upon how many "step-outs" are needed to delineate the location of the fault trace.

Protective surface casing will be installed in all boreholes to prevent potential contamination into the deeper LHSU from the overlying UHSU. Protective casing will be installed according to SOP GT.03, "Isolating Bedrock from the Alluvium with Grouted Surface Casing". Drill-core will not be obtained from the alluvium or shallow bedrock in order to minimize costs and avoid the generation of redundant data. The shallow stratigraphy of this area has been delineated by previous boreholes and monitoring wells. Drill-core will be obtained from depths greater than 50 feet to the total depth. This drill-core will be logged according to SOP GT.01 "Logging Alluvial and Bedrock Material". Logging this drill-core will provide lithologic information on the claystone marker bed, offset along the fault plane, and stratigraphic information on the deeper Laramie Formation of the LHSU.

Down-hole geophysical logging will be conducted by Parsons ES in each borehole to confirm the presence of the claystone marker bed. The geophysical signature of this marker bed has been identified from geophysical logs of the previously mentioned boreholes and monitoring wells. Gamma logs, conductivity logs, and spontaneous potential logs will be obtained from each borehole. Neutron logs will not be run in order to eliminate the need for a radioactive downhole source, which could potentially be lost downhole if the borehole caved while readings are being obtained. The drilling activities will verify if the fault exists and pinpoint its location. Trenching will be used to establish the capability of the fault. The drilling results will allow the minimization of the trenches length.

II.2 Trenching Activities

Once the location of the fault trace has been ascertained, the capability of the fault will be evaluated through geological logging of a trench dug normal to the strike of the fault trace. The trench will be excavated, logged, and backfilled according to GT.07, "Logging and Sampling of Test Pits, Trenches, and Construction Excavations". The trench will be approximately three feet wide and twenty feet long. The trench will be excavated to a maximum depth of 5 feet into bedrock. The trench will be deep enough to thoroughly examine the alluvial-bedrock contact along the fault trace in order to identify areas where bedrock may or may not be offset and zones of tectonically induced fracturing. Once the trench has been excavated to the desired depth, a steel plate will be placed over the teeth on the bucket of the backhoe in order to produce clean, even exposures of the alluvial-bedrock contact for logging purposes.

Geologic logs of the trench will be used to confirm or deny that movement has occurred along the fault trace within the last one million years, or in other words, to confirm that Rocky Flats Alluvium has or has not been displaced across the fault trace. Therefore, the trench will need to be located on the pediment surface where the Rocky Flats Alluvium is present. Tentatively, until the exact location of the fault is ascertained, the proposed trench will be located on the southern side of the SEPs as shown on the attached structure contour map, where the Rocky Flats Alluvium is present at thicknesses of less than ten feet.

III. Budget

The following table reflects the preliminary order of magnitude estimated drilling/trenching subcontractor costs for installing the minimum (two boreholes) and maximum (four boreholes) number of ~150 foot deep boreholes. Boreholes will likely be shallower than 150 feet, resulting in a reduction of cost. This table does not reflect the anticipated costs for Parsons Engineering-Science personnel.

Borehole Installation costs using a CME 75 Drill Rig

Mobilization/Demobilization	$5,200.
Drilling (per borehole)	$6,000.
Materials/ Grout, Drill Bits	$1,150.
Minimum Sub Total	$18,350.
Maximum Sub Total	$30,350.

The following table reflects the preliminary estimated subcontractor cost for installing one 3'X 10'X 20' trench. This table does not reflect the anticipated costs for Parsons Engineering-Science personnel.

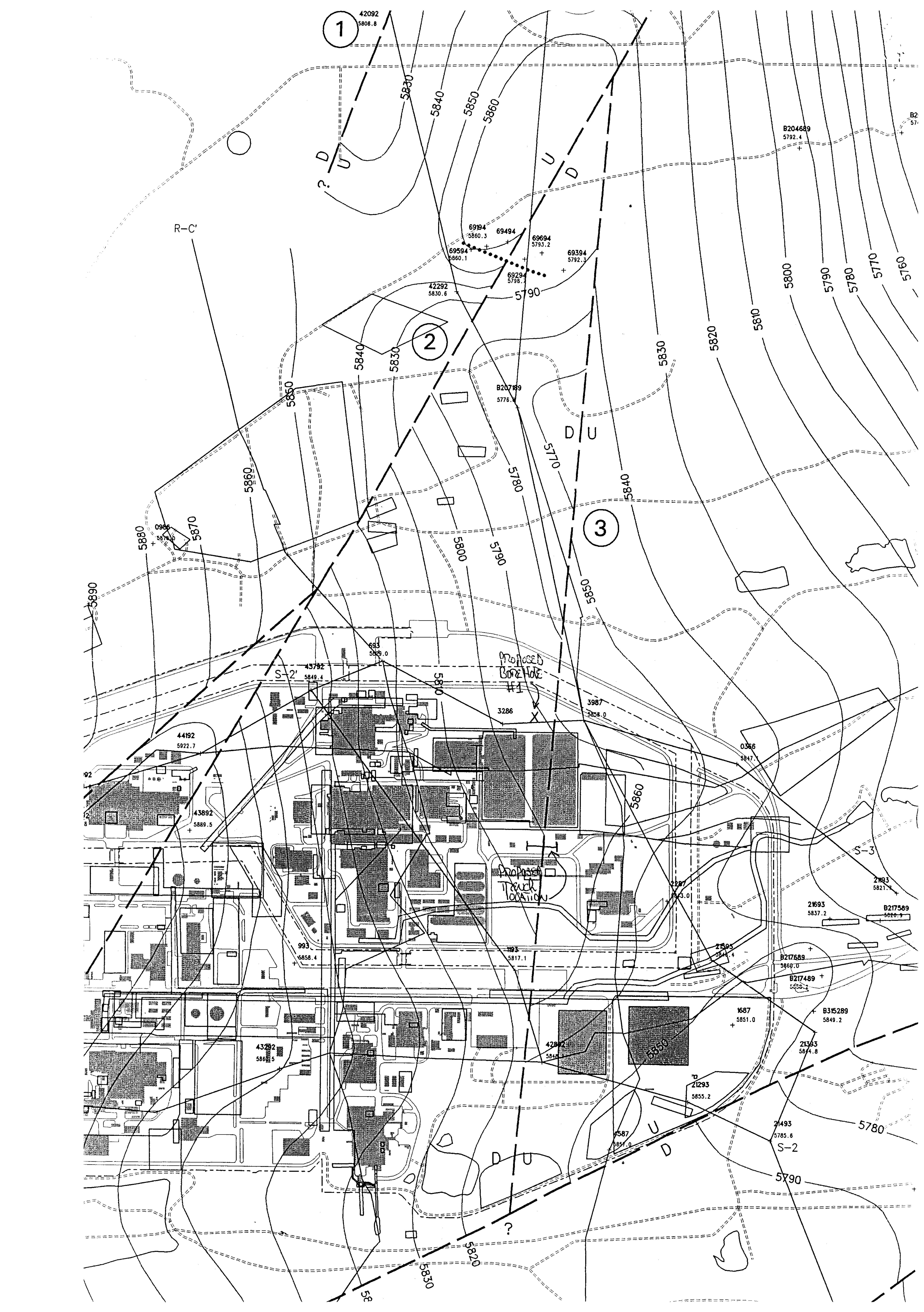
Trench Excavation costs using a Backhoe

Mobilization/Demobilization	$3,000.
Excavation and Backfilling	$3,000.
Materials/ Shoring	$2,000.
Total	$8,000.

Parsons Es estimates that approximately 1,440 labor hours will be required to support this effort at an order of magnitude cost of $90,000 (based on the above scope of work).

Attachment 2
Preliminary Schedule

Work Plan Development and Approval	3 weeks
Mobilization	1 week
Drilling and Geophysics	3-4 weeks (dependent on the # of required borings)
Data Evaluation and Core Logging	2-3 weeks (dependent on the # of required borings)
Mobilization	1 week
Trenching	1 week
Data Evaluation (Trench Logging)	1 week
Preparation of Report	3 weeks
Total	15 to 17 weeks


PROPOSED BOREHOLE #1
PROPOSED TRENCH LOCATION
R-C'
S-2
S-2'
S-3
42092 5808.8
69194 5860.3
69494
69694 5793.2
69394 5792.3
69594 5860.1
69294 5796.7
42292 5830.6
B207189 5776.8
B204689 5792.4
693 5829.0
43792 5849.4
3987 5858.0
3286
44192 5922.7
43892 5889.5
0356 5847.1
21193 5821.7
21693 5837.2
B217589
2287 5843.0
993 5858.4
1193 5817.1
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B217689 5860.0
B217489
1687 5851.0
B315289 5849.2
43292 5860.5
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